

**1 YEAR**  
WARRANTY

# **Ω OMEGA®** **User's Guide**

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**FTB 371 Series**  
Axial Turbine Flow Meter



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## 0 About this operating manual

- The operating manual is aimed at specialists and semi-skilled personnel.
- Before each step, read through the relevant advice carefully and keep to the specified order.
- Thoroughly read and understand the information in the section "Safety instructions".

If you have any problems or questions, please contact your supplier or contact us directly at:



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Stamford, CT 06907-0047

Tel: (203) 359-1660

e-mail: info@omega.com

### Hazard signs and other symbols used:



**CAUTION! Electric current!**

This sign indicates dangers which could arise from handling of electric current.



**WARNING! / CAUTION! Risk of injury!**

This sign indicates dangers that cause personal injuries that can lead to health defects or cause considerable damage to property.



**CAUTION! Material damage!**

This sign indicates actions which could lead to possible damage to material or environmental damage.



**ADHERE TO OPERATING MANUAL!**



**NOTICE!**

This symbol indicates important notices, tips or information.



**NO DOMESTIC WASTE!**

The device must not be disposed of together with domestic waste.



Pay attention to and comply with information that is marked with this symbol.



Follow the specified instructions and steps. Adhere to the given order.



Check the specified points or notices.



Reference to another section, document or source.



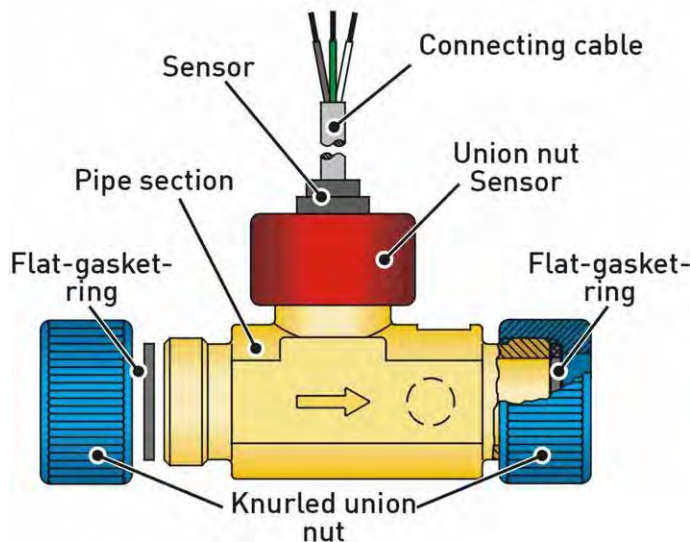
Item.

## 1 Device description

The flow meter of the series FTB 371 from OMEGA ENGINEERING INC. is a transducer for flow rate and total flow measurement.

It has an almost unlimited application through its exceptionally compact design, its very wide measurement range and its convincing measurement accuracy.

### Flow meter components FTB 371:



### Functional principle:

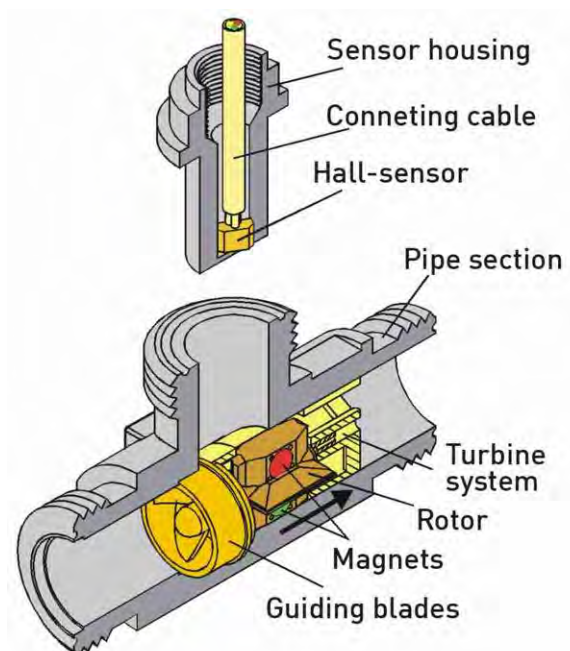
The liquid flowing into the flow meter is divided by the guiding blades in four split beams. These hit the rotor from four directions and put it in motion. The uniform loading of bearing from four sides causes the forces to cancel themselves out for the most part and wear is reduced to a minimum.

The extremely hard bearing materials, sapphire and hard metal, ensure in addition an extraordinary life expectancy.

The rotor speed is transmitted to an electrical pulse signal (frequency):

- The FTB 371 is equipped with magnets on the rotor. A Hall-Effect sensor detects the rotation of the rotor.

A flow-proportional frequency signal (square wave signal) is provided.



## 1.1 Intended use

The flow meter of the series FTB 371 may only be used for flow rate measurements or dosing of liquids. Never use them for gas measurements.



### **WARNING! No safety component!**

The flow meter of the series FTB 371 is not a safety component in accordance with Directive 2006-42-EC (Machine Directive).

⚡ Never use the FTB 371 as a safety component.

The operational safety of the device supplied is only guaranteed by intended use. The specified limits (→ § 8 "Technical data") may under no circumstances be exceeded.

Before ordering and installation, check that the material of the turbine flow monitor is suitable to the medium to be measured and the application (→ § 8.2 "Materials table").

## 2 Safety instructions



Before you install the FTB 371, read through this operating manual carefully. If the instructions contained within it are not followed, in particular the safety guidelines, this could result in danger for people, the environment, and the device and the system it is connected to.

The FTB 371 corresponds to the state-of-the-art technology. This concerns the accuracy, the operating mode and the safe operation of the device.

In order to guarantee that the device operates safely, the operator must act competently and be conscious of safety issues.

OMEGA ENGINEERING INC. provides support for the use of its products either personally or via relevant literature. The customer verifies that our product is fit for purpose based on our technical information. The customer performs customer- and application-specific tests to ensure that the product is suitable for the intended use. With this verification all hazards and risks are transferred to our customers; our warranty is not valid.

### **Qualified personnel:**

- ⚠ The personnel who are charged for the installation, operation and maintenance of the FTB 371 must hold a relevant qualification. This can be based on training or relevant tuition.  
The personnel must be aware of this operating manual and have access to it at all times.
- ⚠ The electrical connection should only be carried out by a fully qualified electrician.

### **General safety instructions:**

- ⚠ In all work, the existing national regulations for accident prevention and safety in the workplace must be complied with. Any internal regulations of the operator must also be complied with, even if these are not mentioned in this manual.
- ⚠ You can mount the flow meter in any position. If it is installed into vertical pipes, the flow direction is preferably upwards. You must avoid a free outlet.



- ⚠ The arrow which is placed on the flow meter(➔) shows the only permitted flow direction.
- ⚠ For precise measurement, the length of the in- and outlet tubes must be observed (→ § 3 "Important notes to installation and operation").
- ⚠ The internal diameter of the in- and outlet tube must correspond with the internal diameter of the turbine flow monitor.
- ⚠ The flow medium to be monitored should preferably contain as few solid particles as possible. Present particles must not exceed a diameter of 0.5 mm. If necessary, install a screen filter.
- ⚠ Avoid absolutely the formation of gas bubbles or cavitation in the medium by taking proper measures.
- ⚠ The material of the series FTB 371 is **not suitable** for monitoring oils. The strength of the used plastic parts would be considerably reduced.
- ⚠ In order to clean the flow monitor of contaminations, flush the unit reverse to the flow direction (→ § 6 "Cleaning of the flow meter").
- ⚠ Suitable measures should be taken to prevent the medium from freezing.
- ⚠ A possible blowing out of the device FTB 371 must take place only in opposite direction to the flow.
- ⚠ We recommend to use only screened connection cables. Connect the shield on one side (the wire ends) on ground.
- ⚠ **Attention:**  
The union nut of the sensor (Hall-Effect-Sensor or inductive proximity switch) is sealed and must not be opened!  
When you still open this component, the fixation of the turbine system is disturbed and it will be damaged.

### Special safety instructions:

Warnings that are specifically relevant to individual operating procedures or activities can be found at the beginning of the relevant sections of this operating manual.

## 3 Important notes to installation and operation

Observe the following instructions in order to achieve highest-possible measurement accuracy and specified output signal:

- Before installing the turbine flow monitor flush the pipe carefully. You avoid a blocking of the turbine caused by particles from the pipe installation.
- The installation position of the flow monitor is unreserved. If it is installed into vertical pipes, the flow direction is preferably from below upward. You must avoid a free outlet.
- The arrow which is placed on the flow monitor (➔) shows the only permitted flow direction.

- In order to achieve the best measurement accuracy, a straight tube in front of the flow monitor must be retained, min 10 x DN. Behind the flow monitor, a straight outlet tube of 5 x DN must be kept.  
The internal diameter of the in- and outlet tubes must correspond with the internal diameter of the flow monitor. Before and behind the stabilization tubes, the line may be contracted or enlarged.  
In practice these instructions often can not be observed. Then the pulse rate and the measurement accuracy can be affected.
- The flow medium to be monitored should preferably contain as few solid particles as possible. Present particles must not exceed a diameter of 0.5 mm. If necessary, install a screen filter!
- The material of the series FTB 371 is not suitable for monitoring oils. The strength of the used plastic parts would be considerably reduced.
- **Attention:**  
The union nut of the sensor (Hall-Effect-Sensor or inductive proximity switch) is sealed and must not be opened!  
When you still open this component, the fixation of the turbine system is disturbed and it will be damaged.

## 4 Installation in piping

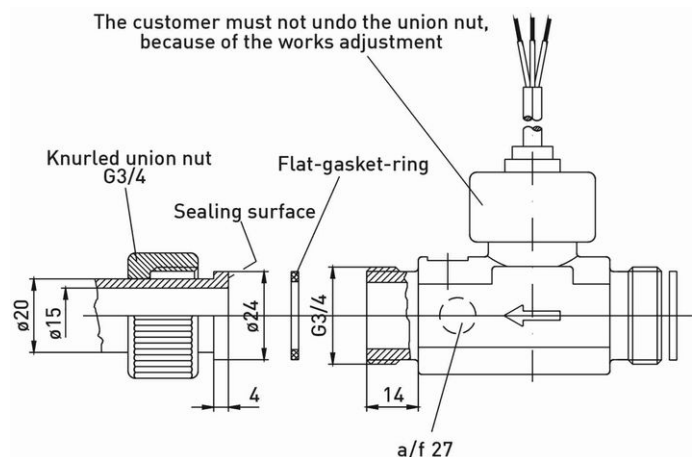
Now you can install the flow meter in the piping system which was prepared according to § 3.

### Note:

- Use only a suitable compound for sealing.  
If you seal the male thread, take care that no fibrous sealing compounds get into the turbine (hemp or Teflon strip).

### Installation:

- ✎ Make sure that your piping system has a collar. The face of the collar serves as sealing area. The collar is pressed against the flat seal by the provided knurled union nut.
- ✎ Now install the turbine. Make sure that the provided seals fit properly and tighten the union nuts.
- ✎ You must tighten the plastic union nuts with a torque of max. 8 Nm.





## 5 Electrical connection

**Attention:** We recommend to use only screened cables. Connect the shield on one side (the wire ends) on ground.

### 5.1 FTB 371 with pulse output

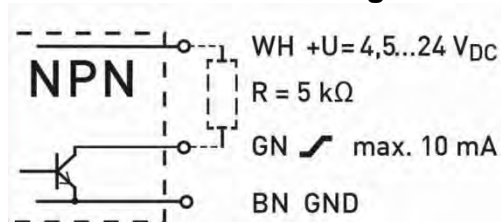
The output signal of the flow meter is a flow-proportional frequency signal. The shape of the signal is a square wave and its amplitude corresponds approximately with the supply voltage. It is an open collector signal, NPN- or PNP-switching.

The connected electronic instrument should have a loading resistance (pull-up or pull-down resistor) of 5 k $\Omega$  in the inlet.

#### Schematic representation:

A connection is made with three leads, the supply voltage must be connected between +U and GND (ground), the output signal can be tapped between  $\neg$  and GND. The colour assignment of the supply cables can be taken from the sketch on the type plate.

#### FTB 371 with connecting cable:



#### Colour code:

BN = brown  
 GN = green  
 WH = white  
 R = resistor

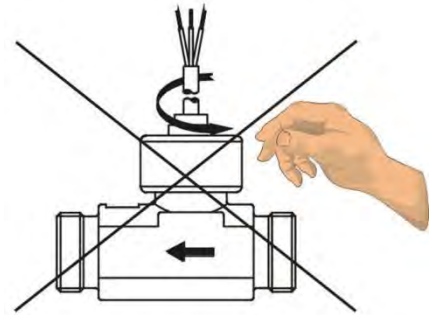
## 6 Cleaning of the flow meter

**Attention:**

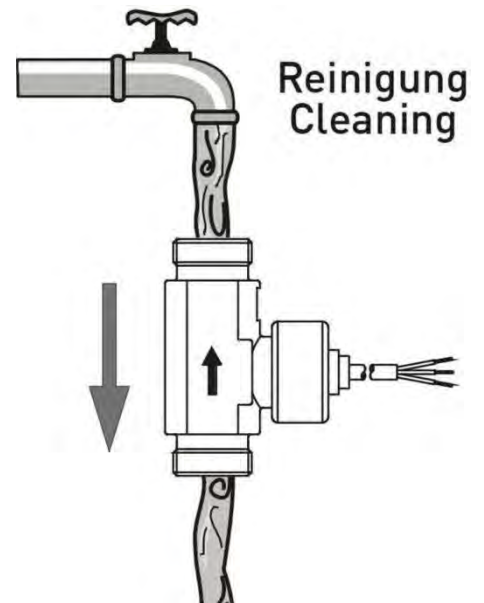
The union nut of the sensor- is sealed and must not be opened!

When you still open this component, the fixation of the turbine system is disturbed and it will be damaged.

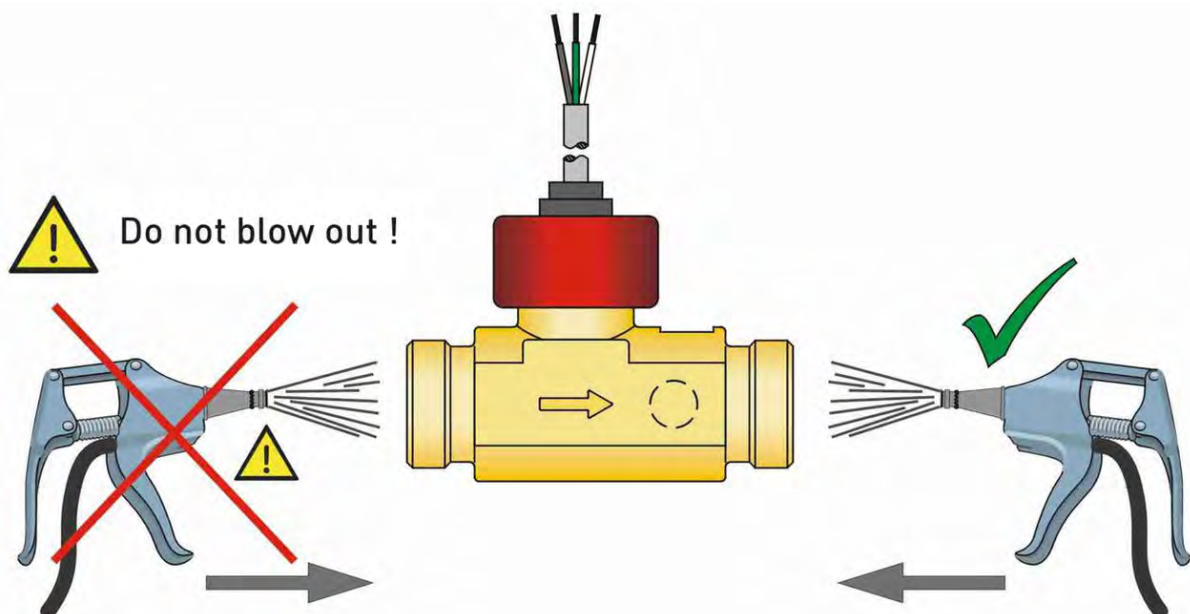
A repair in the factory becomes necessary!



- ↪ To remove dirt from the flow meter, you should flush it with water reverse to the flow direction.



- **Warning:**  
The FTB 371 may only be blown against the flow direction with compressed air.  
When blowing out in flow direction, the turbine bearing can be damaged.



## 7 Disassembly and disposal

**CAUTION! Risk of injury!**

Never remove the device from a plant in operation.

⇒ Make sure that the plant is shut down professionally.

**Before disassembly:**

Prior to disassembly, ensure that

- ☐ the equipment is switched off and is in a safe and de-energised state.
- ☐ the equipment is depressurised and has cooled down.

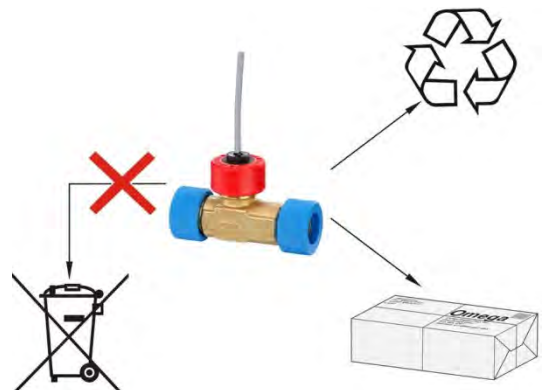
**Disassembly:**

- ⇒ Remove the electrical connectors.
- ⇒ Remove the FTB 371 using suitable tools.

**Disposal:****NO HOUSEHOLD WASTE!**

The FTB 371 consists of various different materials. It must not be disposed of with household waste.

- ⇒ Take the FTB 371 to your local recycling plant
- or
- ⇒ send the FTB 371 back to your supplier or to OMEGA ENGINEERING INC..



## 8 Technical data

The technical data of customised versions may differ from the data in these instructions. Please observe the information specified on the type plate.

### 8.1 FTB 371 with pulse output

Type	FTB 371
<b>Characteristics measurement device <sup>*1)</sup></b>	
Measuring range	2...40 l/min • with continuous operation max. 20 l/min
Accuracy	±1 % of range
Repeatability	±0.2 %
Signal output from	< 0.3 l/min
Sensor	Hall-sensor
<b>Characteristics output signal</b>	
Pulse rate / K-factor	855 pulses/l
Resolution	1.2 ml/pulse
Signal shape	Square wave signal NPN open collector
Signal current, max.	10 mA
Pull-up-resistor	5 kΩ (recommendation)
<b>Electrical characteristics</b>	
Supply voltage	4.5...24 V <sub>DC</sub>
Current consumption	< 10 mA
Electrical connection: - Cable, screened T <sub>max</sub> =	1.5 m PVC 70 °C
Degree of protection (EN 60529)	IP 54
<b>Process variables</b>	
Medium temperature, max.	85 °C
Medium temperature, min.	0 °C, not freezing
Ambient temperature	0...75 °C
Nominal diameter	DN 15
Nominal pressure	PN 10
Particle size in the medium	< 0.5 mm
Process connection	¾" BSP male with union nuts and flat seals

<sup>\*1)</sup> The stated values refer to operation with water at 20 °C. Monitoring of fluids with higher viscosities is possible with the effect of deviations from mentioned values.

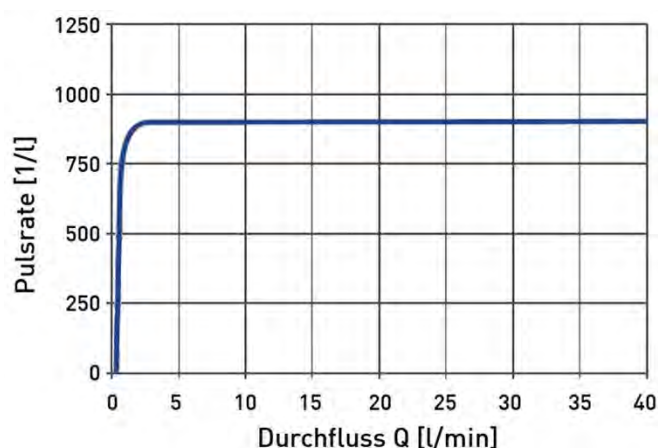
## 8.2 Materials table

Type	FTB 371	*1)
Pipe section	Brass CW602N	X
Turbine sytem	PEI ULTEM	X
Rotor assembly	Hard ferrite magnets	X
Bearing system / shaft	Shaft Arcap AP1D with hard metal pins in sapphire bearings	X
Bearings support	Shaft Arcap AP1D	X
Union nut sensor	PA 6	-/-
Sensor	PPO Noryl GFN3	X
Knurled unnion nuts	PA 66	
O-ring / flat gasket	NBR	X
Screen filter (optional)	POM / Stainless steel	X

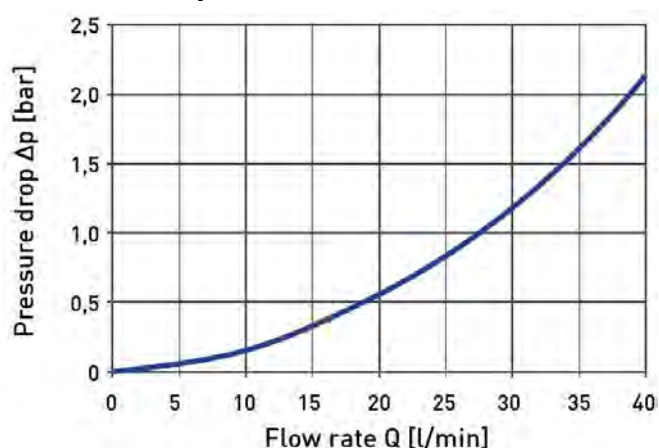
\*1) Wetted components.

## 8.3 Characteristic curves, pressure drop

Characteristic curves:

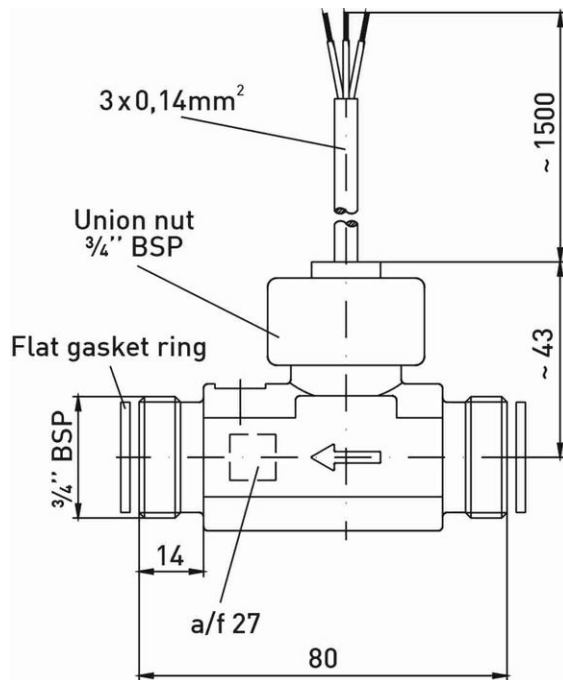


Pressure drop:



## 8.4 Dimensions

### FTB 371





## WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's Warranty adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

**OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by the company will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.**

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## RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence. The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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